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EXAMINER	
YU, JAE UN	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/816,913	MORIMOTO, HIROYUKI	
	Examiner	Art Unit	
	Jae U. Yu	2185	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4/5/2004 7/20/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

The instant application having Application No. 10/816,913 has a total of 15 claims pending in the application, there are 3 independent claims and 12 dependent claims, all of which are ready for examination by the examiner.

Oath/Declaration

The applicant's oath/declaration has been reviewed by the examiner and is found to conform to the requirements prescribed in 37 CFR 1.63.

Status of Claim for Priority in the Application

As required by MPEP 201.14(C), acknowledgement is made of applicant's claim for priority based on an application filed in 1/28/2004.

Drawings

The applicant's submitted on 4/5/2004 are acceptable for examination purposes.

Information Disclosure Statement

As required by MPEP 609(C), the applicant's submission of the Information Disclosure Statement dated 4/5/2004 and 7/20/2005 is acknowledged by the examiner and the cited references have been considered in the examination of the claims now pending. As required by MPEP 609C(2), a copy of the PTOL-1449 initialed and dated by the examiner is attached to the instant office action.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1-2, 5-7, 10-12, and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Meehan et al. (US 2004/0177218 A1), "A Case for Redundant Arrays of Inexpensive Disks (RAID)" by Patterson et al. as incorporated by reference in paragraph 5 of Meehan et al., and "The RAID Book" by Massiglia as incorporated by reference in paragraph 5 of Meehan et al..

2. **Independent claim 1** discloses, "a storage unit" **["Level 3 RAID Controller (1)" and its sub-disks 320, Figure 5 of Meehan et al.],** "other storage units each having a plurality of first hard disk drives" **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.],** and "second hard disk drives" **[(a) Level RAID Controller" and its sub-disks 330, Figure 5 of Meehan et al.].**

"A first receiving unit **["Level 3 RAID Controller (1)", Figure 5 of Meehan et al.]** that receives copies of first storage data and first identifiers from said other storage units

["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.] The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to "calculate check info" (Figure 3, Patterson et al.), it is inherent that the "Level 3 RAID Controller (1)" receives copies of parity data of "Disk 2" and "Disk x" ("first data" from the claim) from the "Secondary RAID Controller (1)". **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "first data receiving unit" from the claim. Since the "Level 3 RAID Controller" performs the same operation as the "first data receiving unit", it is inherent that the controller contains the "first data receiving unit".

"Said first storage data being stored in plurality of other storage blocks created by logically partitioning a data storage area of said plurality of first hard disk drives, said first identifiers identifying the storage blocks" **Patterson et al. disclose the data stored in logically partitioned data disks ("Data Disks 1-4") with the sector numbers in Figure 3 on page 113.**

"A first operation controller **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that calculates an exclusive OR of the copies of the first storage data, with a correspondence established among the first identifiers, from the copies of the first

storage data received by said first receiving unit from said other storage units" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8. **Patterson et al. disclose RAID-4 parity generation "each parity bit is just a single exclusive OR of all corresponding data bit in a group" on page 113, in the second column, at lines 9-10,** wherein the correspondence is established by the logical sector numbers ("first identifiers" from the claim) disclosed in Figure 3. Since the "Level 3 RAID Controller" performs the same operations as the "first operation controller", it is inherent that the "Level 3 RAID controller" contains the "first operation controller".

"A first storage controller **["(a) Level RAID Controller" 330, Figure 5 of Meehan et al.]** that stores a calculation result of the exclusive OR into storage blocks of said second hard disk drives, said storage blocks of said second hard disk drives having second identifiers corresponding to the first identifiers, said second identifiers individually identifying a plurality of storage blocks created by logically partitioning a data storage area of said plurality of second hard disk drives" **Meehan et al. disclose in paragraph 6, at lines 3-4, "RAID controller** ("(a) Level RAID Controller" 330) **that reads and writes data** ("calculation result" from the claim) **to the underlying storage devices** ("second hard disk drives" from the claim)**". Patterson et al. disclose the data stored in logically partitioned parity disk ("Check Disk") with the sector numbers in Figure 3 on page 113, wherein the sector numbers of the "Check Disk"** ("second

identifier" from the claim) **corresponds to the sector numbers of the "Data Disks"** ("first identifier" from the claim) **(Page 113, Column 2, Lines 9-10).**

3. **Claim 2** discloses, "A second receiving unit **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that receives a calculation result of an exclusive OR between write data and the first storage data, as well as the first identifiers that identifies the storage block in which the write data is to be written, from said other storage unit **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]**, said calculation result being calculated by said other storage unit that receives the write data **[data write operation, Meehan et al., Paragraph 6, Lines 3-5]** to said first hard disk drives from an information processing unit **["Primary RAID Controller" 305, Figure 5 of Meehan et al.]**, said first storage data being stored in the storage block of said first hard disk drives **[Logical Sectors of the "Data Disks", Figure 3, Patterson et al.]** in which the write data is to be written" **Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "old data" corresponds to the "first storage data" from the claim, and the "new data" corresponds to the "write data" from the claim. The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to update the parity (refer to the parity update equation above), it is inherent that the "Level 3 RAID Controller (1)" receives the result of "old data xor new data" from the

"Secondary RAID Controller (1)". Since the "Level 3 RAID Operation Controller (1)" receives the result of the excusive OR, it is inherent that the "Level 3 RAID Operation Controller (1)" contains the "second receiving unit" from the claim which performs the same operation. **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "second receiving unit" from the claim.

"A second operation controller **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that calculates an exclusive OR between the calculation result received by said receiving unit and second storage data stored in the storage block of said second hard disk drives identified by the second identifier corresponding to the first identifier received by said second receiving unit" **Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "old parity" corresponds to the "second storage data" from the claim. **Patterson et al. disclose "each parity bit is just a single exclusive OR of all corresponding data bit in a group" on page 113, in the second column, at lines 9-10,** wherein the correspondence is established among the logical sector numbers of the "data disks" ("first identifiers" from the claim) and the logical sector numbers of the "check disk" ("second identifiers" from the claim) disclosed in Figure 3. Since the "Level 3 RAID Controller (1)" calculates an exclusive OR between the received XOR result and the old

parity, it is inherent that "Level 3 RAID Operation Controller" contains the "second operation controller" from the claim, which performs the same operation.

"A second storage controller **["(a) Level RAID Controller" 330, Figure 5 of Meehan et al.]** that stores a calculation result of the exclusive OR into the storage block of said second hard disk drives identified by the second identifier" **Meehan et al. disclose in paragraph 6, at lines 3-4, "RAID controller** ("(a) Level RAID Controller" 330) **that reads and writes data** ("calculation result" from the claim) **to the underlying storage devices** ("second hard disk drives" from the claim)**". Patterson et al. disclose the data stored in logically partitioned parity disk ("Check Disk") with the sector numbers in Figure 3 on page 113, wherein the sector numbers of the "Check Disk"** correspond to the "second identifier" from the claim. Since the "(a) Level RAID Controller" stores the updated parity ("the result of the exclusive OR" from the claim), it is inherent that the "(a) Level RAID Controller" contains the "second storage controller" from the claim, which performs the same operation.

4. **Claim 5** recites, "A fifth receiving unit **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that receives, from one of said other storage units, a request to send the first storage data to be stored in said first hard disk drives of said one of the other storage units **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a

RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122).** If one of the sub-disks of "Secondary RAID Controller (1)" 310 fails, it is inherent that the "Secondary RAID Controller (1)" sends a data regeneration request to its parity disk ("Level 3 RAID Controller (1)"). Therefore, the "Level 3 RAID Controller (1)" ("fifth receiving unit" from the claim) receives a data regeneration request from the "Secondary RAID Controller (1)", wherein the "data regeneration request" correspond to the "request to send the first storage data" from the claim. Since the "Level 3 RAID Controller (1)" performs the same operation as the "fifth receiving unit" from the claim, it is inherent that the "Level 3 RAID Controller" contains the "fifth receiving unit".

"A first sending unit **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that sends a request to send a copy of the first storage data, as well as the first identifiers that identify the storage blocks in which the first storage data is stored, to said other storage units other than said one of said other storage units **[Working Sub-disks of Secondary RAID Controller (1)" 310, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122).** In order to perform the XOR operation in Figure 57, the "Level 3 RAID Controller (1)" needs the copy of working sub-disks of the "Secondary

RAID Controller (1)". Therefore, it is inherent that the "Level 3 RAID Controller (1)" sends a request to send a copy of the working sub-disks ("first storage data" from the claim). **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "Level 3 RAID Controller (1)".

"A sixth receiving unit **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that receives the copy of the first storage data as well as the first identifiers from each of other storage units other than said one of said other storage units **[Working Sub-disks of Secondary RAID Controller (1)" 310, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122).** In order to perform the XOR operation in Figure 57, it is inherent that the "Level 3 RAID Controller (1)" recieves the copy of working sub-disks of the "Secondary RAID Controller (1)". **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "Level 3 RAID Controller (1)". Since the "Level 3 RAID Controller (1)" performs the same operation as

the "sixth receiving unit" from the claim, it is inherent that the "Level 3 RAID Controller" contains the "sixth receiving unit".

"A fifth operation controller **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that calculates an exclusive OR between copies of the first storage data and second storage data, said second storage data being stored in the storage blocks of said second hard disk drives identified by the second identifiers corresponding to the first identifiers" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122). An exclusive OR is calculated between the "Member Disks A-C"** ("first storage data" from the claim) **and "Member Disk E (Parity)"** ("Second Storage Data" from the claim). The correspondence is established by the logical sector numbers of the "Data Disks" ("first identifiers" from the claim) and the logical sector numbers of the "Check Disk" ("second identifiers" from the claim) as disclosed in Figure 3 of Patterson et al.. Since the "Level 3 RAID Controller (1)" performs the same operation as the "fifth operation controller" from the claim, it is inherent that the "Level 3 RAID Controller (1)" contains the "fifth operation controller".

"A second sending unit **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that sends a calculation result of the exclusive OR calculated by said fifth operation

controller, as well as the first identifiers, to said one of said other storage unit **["Secondary RAID Controller (1)" 310 and its sub-disks, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122).** Since the "Secondary RAID Controller (1)" is connected to a plurality of sub-disks, it is inherent that the regenerated data is sent to one of the working sub-disks because it provides protection against further disk failures as disclosed in Massiglia under "Restoring Protection After a Failure" on page 111. Therefore, it is inherent that the "Level 3 RAID Controller (1)" contains the "second sending unit" from the claim because they perform the same operation. **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim.

5. **Independent claim 6** discloses, ""a storage unit" **["Level 3 RAID Controller (1)" and its sub-disks 320, Figure 5 of Meehan et al.],** "other storage units each having a plurality of first hard disk drives" **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]**, and "second hard disk drives" **[(a) Level RAID Controller" and its sub-disks 330, Figure 5 of Meehan et al.]**.

"Receiving copies of first storage data and first identifiers from said other storage units **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to "calculate check info" (Figure 3, Patterson et al.), it is inherent that the "Level 3 RAID Controller (1)" receives copies of parity data of "Disk 2" and "Disk x" ("first data" from the claim) from the "Secondary RAID Controller (1)". **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim.

"Said first storage data being stored in a plurality of storage blocks created by logically partitioning a data storage area of said plurality of first hard disk drives, said first identifiers identifying the storage blocks" **Patterson et al. disclose the data stored in logically partitioned data disks ("Data Disks 1-4") with the sector numbers in Figure 3 on page 113.**

"Calculating an exclusive OR of the copies of the first storage data, with a correspondence established among the first identifiers, from the copies of the first storage data received from said other storage units" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller"

as taught by Meehan et al. in paragraph 23, at lines 7-8. **Patterson et al. disclose RAID-4 parity generation, "each parity bit is just a single exclusive OR of all corresponding data bit in a group" on page 113, in the second column, at lines 9-10,** wherein the correspondence is established by the logical sector numbers ("first identifiers" from the claim) disclosed in Figure 3.

"Storing a calculation result of the exclusive OR into storage blocks of said second hard disk drives, said storage blocks of said second hard disk drives having second identifiers corresponding to the first identifiers, said second identifiers individually identifying a plurality of storage blocks created by logically partitioning a data storage area of said plurality of second hard disk drives" **Meehan et al. disclose in paragraph 6, at lines 3-4, "RAID controller** ("(a) Level RAID Controller" 330) **that reads and writes data** ("calculation result" from the claim) **to the underlying storage devices** ("second hard disk drives" from the claim)**". Patterson et al. disclose the data stored in logically partitioned parity disk ("Check Disk") with the sector numbers in Figure 3 on page 113, wherein the sector numbers of the "Check Disk"** ("second identifier" from the claim) **corresponds to the sector numbers of the "Data Disks"** ("first identifier" from the claim) **(Page 113, Column 2, Lines 9-10).**

6. **Claim 7** discloses, "receiving a calculation result of an exclusive OR between write data and the first storage data, as well as the first identifier that identifies the

storage block in which the write data is to be written, from said other storage unit **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]**, said calculation result being calculated by said other storage unit that receives the write data **[data write operation, Meehan et al., Paragraph 6, Lines 3-5]** to said first hard disk drives from an information processing unit **["Primary RAID Controller" 305, Figure 5 of Meehan et al.]**, said firs storage data being stored in the storage block of said first hard disk drives **[Logical Sectors of the "Data Disks", Figure 3, Patterson et al.]** in which the write data is to be written" **Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "old data" corresponds to the "first storage data" from the claim, and the "new data" corresponds to the "write data" from the claim. The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to update the parity (refer to the parity update equation above), it is inherent that the "Level 3 RAID Controller (1)" receives the result of "old data xor new data" from the "Secondary RAID Controller (1)". **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim.

"Calculating an exclusive OR between the calculation result and second storage data in the storage block of said second hard disk drives identified by the second identifier

corresponding to the first identifier" **Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "old parity" corresponds to the "second storage data" from the claim. **Patterson et al. disclose "each parity bit is just a single exclusive OR of all corresponding data bit in a group" on page 113, in the second column, at lines 9-10,** wherein the correspondence is established among the logical sector numbers of the "data disks" ("first identifiers" from the claim) and the logical sector numbers of the "check disk" ("second identifiers" from the claim) disclosed in Figure 3.

"Storing a calculation result of the exclusive OR into the storage block of said second hard disk drives identified by the second identifier" **Meehan et al. disclose in paragraph 6, at lines 3-4, "RAID controller** ("(a) Level RAID Controller" 330) **that reads and writes data** ("calculation result" from the claim) **to the underlying storage devices** ("second hard disk drives" from the claim)**". Patterson et al. disclose the data stored in logically partitioned parity disk ("Check Disk") with the sector numbers in Figure 3 on page 113, wherein the sector numbers of the "Check Disk"** correspond to the "second identifier" from the claim.

7. **Claim 10** discloses, "receiving, from one of said other storage units, a request to send the first storage data to be stored in said first hard disk drives of said one of said other storage units **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a

RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122).** If one of the sub-disks of "Secondary RAID Controller (1)" 310 fails, it is inherent that the "Secondary RAID Controller (1)" sends a data regeneration request to its parity disk ("Level 3 RAID Controller (1)"). Therefore, the "Level 3 RAID Controller (1)" receives a data regeneration request from the "Secondary RAID Controller (1)", wherein the "data regeneration request" correspond to the "request to send the first storage data" from the claim.

"Sending a request to send a copy of the first storage data, as well as the first identifiers that identify the storage blocks in which the first storage data is stored, to said other storage units other than said one of said other storage units **[Working Sub-disks of Secondary RAID Controller (1)" 310, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122).** In order to perform the XOR operation in Figure 57, the "Level 3 RAID Controller (1)" needs the copy of working sub-disks of the "Secondary RAID Controller (1)". Therefore, it is inherent that the "Level 3 RAID Controller (1)" sends a request to send a copy of the working sub-disks ("first storage data" from the claim). **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign**

unique identification or LUNs to the components or nodes it controls." The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "Level 3 RAID Controller (1)".

"Receiving the copy of the first storage data as well as the first identifiers from each of the other storage units other than said one of said other storage units **[Working Sub-disks of Secondary RAID Controller (1)" 310, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122).** In order to perform the XOR operation in Figure 57, it is inherent that the "Level 3 RAID Controller (1)" recieves the copy of working sub-disks of the "Secondary RAID Controller (1)". **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "Level 3 RAID Controller (1)".

"Calculating an exclusive OR between copies of the first storage data and second storage data, said second storage data being stored in the storage blocks of said second hard disk drives identified by the second identifiers corresponding to the first identifiers" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4

parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122). An exclusive OR is calculated between the "Member Disks A-C"** ("first storage data" from the claim) **and "Member Disk E (Parity)"** ("Second Storage Data" from the claim). The correspondence is established by the logical sector numbers of the "Data Disks" ("first identifiers" from the claim) and the logical sector numbers of the "Check Disk" ("second identifiers" from the claim) as disclosed in Figure 3 of Patterson et al..

"Sending a calculation result of the exclusive OR as well as the first identifiers to said one of said other storage unit **["Secondary RAID Controller (1)" 310 and its sub-disks, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122).** Since the "Secondary RAID Controller (1)" is connected to a plurality of sub-disks, it is inherent that the regenerated data is sent to one of the working sub-disks because it provides protection against further disk failures as disclosed in Massiglia under "Restoring Protection After a Failure" on page 111. **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim.

8. **Independent claim 11** discloses, ""a storage unit" **["Level 3 RAID Controller (1)" and its sub-disks 320, Figure 5 of Meehan et al.],** "first storage units each having a plurality of first hard disk drives" **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.],** and "second hard disk drives" **[(a) Level RAID Controller" and its sub-disks 330, Figure 5 of Meehan et al.].**

"A first data sending unit **["Secondary RAID Controller (1)" 310, Figure 5 of Meehan et al.]** that sends a copy of first data and first identifiers to said second storage unit **["Level 3 RAID Controller (1)" and its sub-disks 320, Figure 5 of Meehan et al.]"** The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to "calculate check info" (Figure 3, Patterson et al.), it is inherent that the "Secondary RAID Controller (1)" sends copies of parity data of "Disk 2" and "Disk x" ("first data" from the claim) to the "Level 3 RAID Controller (1)". In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls." The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "Level 3 RAID Controller (1)"

"Said first storage data being stored in a plurality of storage blocks created by logically partitioning a data storage area of said plurality of first hard disk drives, said first identifiers identifying the storage blocks" **Patterson et al. disclose the data stored in logically partitioned data disks ("Data Disks 1-4") with the sector numbers in Figure 3 on page 113.**

"A first data receiving unit **["Level 3 RAID Controller (1)", Figure 5 of Meehan et al.]** that receives copies of the first storage data and the first identifiers from said first storage units **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to "calculate check info" (Figure 3, Patterson et al.), it is inherent that the "Level 3 RAID Controller (1)" receives copies of parity data of "Disk 2" and "Disk x" ("first data" from the claim) from the "Secondary RAID Controller (1)". **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "first data receiving unit" from the claim. Since the "Level 3 RAID Controller" performs the same operation as the "first data receiving unit", it is inherent that the controller contains the "first data receiving unit".

"A first data operation controller **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that calculates an exclusive OR of the copies of the first storage data, with a correspondence established among the first identifiers, from the copies of the first storage data received by said first receiving unit from said first storage units" **Patterson et al. disclose "each parity bit is just a single exclusive OR of all corresponding data bit in a group" on page 113, in the second column, at lines 9-10,** wherein the correspondence is established by the logical sector numbers ("first identifiers" from the claim) disclosed in Figure 3. Since the "Level 3 RAID Controller" performs the same operation as the "first data operation controller", it is inherent that the "Level 3 RAID Controller" contains the "first data operation controller".

"A first data storage controller **["(a) Level RAID Controller" 330, Figure 5 of Meehan et al.]** that stores a calculation result of the exclusive OR into storage blocks of said second hard disk drives, said storage blocks of said second hard disk drives having second identifiers corresponding to the first identifiers, said second identifiers individually identifying a plurality of storage blocks created by logically partitioning a data storage area of said plurality of second hard disk drives" **Meehan et al. disclose in paragraph 6, at lines 3-4, "RAID controller** ("(a) Level RAID Controller" 330) **that reads and writes data** ("calculation result" from the claim) **to the underlying storage devices** ("second hard disk drives" from the claim)**". Patterson et al. disclose the data stored in logically partitioned parity disk ("Check Disk") with the sector numbers in Figure 3 on page 113, wherein the sector numbers of the "Check**

Disk" ("second identifier" from the claim) **corresponds to the sector numbers of the "Data Disks"** ("first identifier" from the claim) **(Page 113, Column 2, Lines 9-10).**

9. **Claim 12** discloses, "A second data operation controller **["Secondary RAID Controller (1)" 310, Figure 5 of Meehan et al.]** that calculates an exclusive OR between the write data and the first storage data stored in the storage block of said first hard disk drives **[Logical Sectors of the "Data Disks", Figure 3, Patterson et al.]** into which the data is to be written" **Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "old data" corresponds to the "first storage data" from the claim, and the "new data" corresponds to the "write data" from the claim. The "Secondary RAID Controller (1)" and its sub-disks are operating as a RAID-4 parity disk for the "Primary RAID Controller" 305 as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to update the parity (refer to the parity update equation above), it is inherent that the "Secondary RAID Controller (1)" to calculate the XOR operation between the "old data" and the "new data".

"A second data sending unit **["Secondary RAID Controller (1)" 310, Figure 5 of Meehan et al.]** that sends a calculation result of the exclusive OR calculated by said second data operation controller **["Secondary RAID Controller (1)" 310, Figure 5 of Meehan et al.]**, as well as said first identifier that identifies the storage block into which

the write data is to be written, to said second storage unit **["Level 3 RAID Controller (1)" and its sub-disks 320, Figure 5 of Meehan et al.]" Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to update the parity (refer to the parity update equation above), it is inherent that the "Level 3 RAID Controller (1)" receives the result of "old data xor new data" from the "Secondary RAID Controller (1)". Since the "Secondary RAID Controller (1)" sends the result of the excusive OR, it is inherent that the "Secondary RAID Controller" contains the "second data sending unit" from the claim which performs the same operation. **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "second storage unit" from the claim.

"A second data receiving unit **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that receives a calculation result of the exclusive OR, as well as the first identifier, from said first storage unit **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]" Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID

Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to update the parity (refer to the parity update equation above), it is inherent that the "Level 3 RAID Controller (1)" receives the result of "old data xor new data" from the "Secondary RAID Controller (1)". Since the "Level 3 RAID Operation Controller (1)" receives the result of the excusive OR, it is inherent that the "Level 3 RAID Controller (1)" contains the "second receiving unit" from the claim, which performs the same operation. **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifier" from the claim, and the "components" correspond to the "second data receiving unit" from the claim.

"A third data operation controller **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that calculates an exclusive OR between the calculation result received by said second data receiving unit and second storage data stored in the storage block of said second hard disk drives identified by the second identifier corresponding to the first identifier received by said second data receiving unit" **Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "old parity" corresponds to the "second storage data" from the claim. **Patterson et al. disclose "each parity bit is just a single exclusive OR of all corresponding data bit in a group" on page 113, in the second column, at lines 9-10,** wherein the correspondence is established among the logical sector numbers of the "data disks"

("first identifiers" from the claim) and the logical sector numbers of the "check disk" ("second identifiers" from the claim) disclosed in Figure 3. Since the "Level 3 RAID Controller (1)" calculates an exclusive OR between the received XOR result and the old parity, it is inherent that the "Level 3 RAID Controller (1)" contains the "third operation controller" from the claim, which performs the same operation.

"A second data storage controller **["(a) Level RAID Controller" 330, Figure 5 of Meehan et al.]** that stores a calculation result of the exclusive OR into the storage block of said second hard disk drives identified by the second identifier" **Meehan et al. disclose in paragraph 6, at lines 3-4, "RAID controller** ("(a) Level RAID Controller" 330) **that reads and writes data** ("calculation result" from the claim) **to the underlying storage devices** ("second hard disk drives" from the claim)". **Patterson et al. disclose the data stored in logically partitioned parity disk ("Check Disk") with the sector numbers in Figure 3 on page 113, wherein the sector numbers of the "Check Disk"** correspond to the "second identifier" from the claim. Since the "(a) Level RAID Controller" stores the updated parity ("the result of the exclusive OR" from the claim), it is inherent that "(a) Level RAID Controller" contains the "second storage controller" from the claim, which performs the same operation.

10. **Claim 15** discloses, "a sixth data sending unit **["Secondary RAID Controller (1)" 310, Figure 5 of Meehan et al.]** that sends a request to send the first storage data

to be stored in said first hard disk drives of said first storage unit to said second storage unit **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122).** If one of the sub-disks of "Secondary RAID Controller (1)" 310 fails, it is inherent that the "Secondary RAID Controller (1)" sends a data regeneration request to its parity disk ("Level 3 RAID Controller (1)"), wherein the "data regeneration request" correspond to the "request to send the first storage data" from the claim. Since the "Secondary RAID Controller (1)" performs the same operation as the "sixth data sending unit" from the claim, it is inherent that the "Secondary RAID Controller" contains the "sixth data sending unit".

"A fifth data receiving unit **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that receives the request to send the first storage data from said first storage unit **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]** The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122).** If one of the sub-disks of "Secondary RAID Controller (1)" 310 fails, it is inherent that the "Secondary RAID Controller (1)" sends a data regeneration request to its parity disk ("Level 3 RAID Controller (1)"). Therefore,

the "Level 3 RAID Controller (1)" ("fifth receiving unit" from the claim) receives a data regeneration request from the "Secondary RAID Controller (1)", wherein the "data regeneration request" correspond to the "request to send the first storage data" from the claim. Since the "Level 3 RAID Controller (1)" performs the same operation as the "fifth data receiving unit" from the claim, it is inherent that the "Level 3 RAID Controller (1)" contains the "fifth data receiving unit".

"A seventh data sending unit **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that sends a request to send a copy of the first storage data, as well as the first identifiers that identify the storage blocks in which the first storage data is stored, to said first storage units other than said first storage unit that has sent the request to send said first storage data **[Working Sub-disks of Secondary RAID Controller (1)" 310, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122).** In order to perform the XOR operation in Figure 57, the "Level 3 RAID Controller (1)" needs the copy of working sub-disks of the "Secondary RAID Controller (1)". Therefore, it is inherent that the "Level 3 RAID Controller (1)" sends a request to send a copy of the working sub-disks ("first storage data" from the claim). **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to

the "first identifiers" from the claim, and the "components" correspond to the "Level 3 RAID Controller (1)". Since the "Level 3 RAID Controller (1)" performs the same operation as the "seventh data sending unit" from the claim, it is inherent that the "Level 3 RAID Controller (1)" contains the "seventh data sending unit".

"A sixth data receiving unit **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that receives the copy of the first storage data, as well as the first identifiers, from each of said first storage unit other than said first storage unit that has sent the request to send the first storage data **[Working Sub-disks of Secondary RAID Controller (1)" 310, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122).** In order to perform the XOR operation in Figure 57, it is inherent that the "Level 3 RAID Controller (1)" recieves the copy of working sub-disks of the "Secondary RAID Controller (1)". **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "Level 3 RAID Controller (1)". Since the "Level 3 RAID Controller (1)" performs the same operation as the "sixth data receiving unit" from the claim, it is inherent that the "Level 3 RAID Controller (1)" contains the "sixth data receiving unit".

"A seventh data operation controller **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that calculates an exclusive OR between the copies of the first storage data and second storage data, said copies of the first storage data being the copies of the first storage data received by said sixth data receiving unit and corresponding to the first identifiers" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122). An exclusive OR is calculated between the "Member Disks A-C"** ("first storage data" from the claim) **and "Member Disk E (Parity)"** ("Second Storage Data" from the claim). The correspondence is established by the logical sector numbers of the "Data Disks" ("first identifiers" from the claim) and the logical sector numbers of the "Check Disk" ("second identifiers" from the claim) as disclosed in Figure 3 of Patterson et al.. Since the "Level 3 RAID Controller (1)" performs the same operation as the "seventh data operation controller" from the claim, it is inherent that the "Level 3 RAID Controller (1)" contains the "seventh data operation controller".

"An eighth data sending unit **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that sends a calculation result of the exclusive OR calculated by said seventh data operation controller, as well as the first identifiers, to said first storage unit that has sent the request to send the first storage data **["Secondary RAID Controller (1)" 310**

and its sub-disks, Figure 5 of Meehan et al.]" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122).** Since the "Secondary RAID Controller (1)" is connected to a plurality of sub-disks, it is inherent that the regenerated data is sent to one of the working sub-disks because it provides protection against further disk failures as disclosed in Massiglia under "Restoring Protection After a Failure" on page 111. Therefore, it is inherent that the "Level 3 RAID Controller (1)" contains the "eighth data sending unit" from the claim because they perform the same operation. **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim.

"A seventh data receiving unit **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]** that receives a calculation result of the exclusive OR calculated by said seventh data operation controller, as well as the first identifiers, from said second storage unit **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122).** Since the "Secondary RAID Controller (1)" is

connected to a plurality of sub-disks, it is inherent that the regenerated data is received by one of the working sub-disks because it provides protection against further disk failures as disclosed in Massiglia under "Restoring Protection After a Failure" on page 111. Therefore, it is inherent that the "Second RAID Controller" contains the "seventh data receiving unit" from the claim because they perform the same operation. **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim.

"A fifth data storage controller **["Secondary RAID Controller (1)" 310, Figure 5 of Meehan et al.]** that stores the calculation result of the exclusive OR, received by said seventh data receiving unit, into the storage blocks of said first hard disk drives identified by the first identifiers received by said seventh data receiving unit" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Massiglia discloses the regeneration of data in RAID-4 in Figure 57 (Page 122). Meehan et al. disclose in paragraph 6, at lines 3-4, "RAID controller** ("Secondary RAID Controller (1)" 310) **that reads and writes data** ("calculation result" from the claim) **to the underlying storage devices** ("first hard disk drives" from the claim)**". In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first

identifiers" from the claim. Since the "Secondary RAID Controller (1)" performs the same operation as the "fifth data storage controller" from the claim, it is inherent that "Secondary RAID Controller (1)" contains the "fifth data storage controller".

11. Claims 3-4, 8-9, and 13-14 are rejected under 35 U.S.C. 103 (a) as being obvious over Meehan et al. (US 2004/0177218 A1), "A Case for Redundant Arrays of Inexpensive Disks (RAID)" by Patterson et al. as incorporated by reference in paragraph 5 of Meehan et al., and "The RAID Book" by Massiglia as incorporated by reference in paragraph 5 of Meehan et al. in view of Kawamoto et al. (US 2003/0220985 A1).

12. **Claim 3** discloses "a third receiving unit **["Level 3 RAID Controller (1)", Figure 5 of Meehan et al.]** that receives a copy of the first storage data and the first identifiers from said added other storage unit **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]"** The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to "calculate check info" (Figure 3, Patterson et al.), it is inherent that the "Level 3 RAID Controller (1)" receives copies of parity data of "Disk 2" and "Disk x" ("first data" from the claim) from the "Secondary RAID Controller (1)". **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification"

corresponds to the "first identifiers" from the claim, and the "components" correspond to the "third receiving unit" from the claim. Since the "Level 3 RAID Controller (1)" performs the same operation as the "third receiving unit" from the claim, it is inherent that the "Level 3 RAID Controller (1)" contains the "third receiving unit".

"Said first storage data being stored in the storage blocks of said first hard disk drives of said added other storage unit" **Patterson et al. disclose the data stored in logically partitioned data disks ("Data Disks 1-4") with the sector numbers** (identifies the "blocks" from the claim) **in Figure 3 on page 113.**

"A third operation controller **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that calculates an exclusive OR between the copy of said first storage data received by said third receiving unit and second storage data stored in the storage blocks of said second hard disk drives identified by the second identifiers corresponding to the first identifiers received by said third receiving unit **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8. **Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "old data" corresponds to the "first storage data" from the claim, and the "old parity" corresponds to the "second storage data" from the claim. Since there is no new data being written, the above equation becomes **"new parity = old data xor old parity". Patterson et al.**

disclose "each parity bit is just a single exclusive OR of all corresponding data bit in a group" on page 113, in the second column, at lines 9-10, wherein the correspondence is established among the logical sector numbers of the "data disks" ("first identifiers" from the claim) and the logical sector numbers of the "check disk" ("second identifiers" from the claim) disclosed in Figure 3. Since the "Level 3 RAID Controller (1)" calculates an exclusive OR between the first storage data and second storage data, it is inherent that "Level 3 RAID Operation Controller" contains the "third operation controller" from the claim, which performs the same operation.

"A third storage controller **["(a) Level RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that stores a calculation result of the exclusive OR into the storage blocks of said second hard disk drives identified by the second identifiers" **Meehan et al. disclose in paragraph 6, at lines 3-4, "RAID controller** ("(a) Level RAID Controller" 330) **that reads and writes data** ("calculation result" from the claim) **to the underlying storage devices** ("second hard disk drives" from the claim)**". Patterson et al. disclose the data stored in logically partitioned parity disk ("Check Disk") with the sector numbers in Figure 3 on page 113, wherein the sector numbers of the "Check Disk"** ("second identifier" from the claim) **corresponds to the sector numbers of the "Data Disks"** ("first identifier" from the claim) **(Page 113, Column 2, Lines 9-10).** Since the "(a) Level RAID Controller (1)" performs the same operation as the "third storage controller" from the claim, it inherently contains "third storage controller"

Meehan et al. and its incorporated references do not disclose expressly that "other communicably connected storage unit is added".

Kawamoto et al. disclose "the network storage unit for addition" in paragraph 93, at lines 2-3.

Meehan et al., Tomita and Kawamoto et al. are analogous art because they are from the same field of endeavor of managing/accessing network storages.

At the time of invention it would have been obvious to a person of ordinary skill in the art to modify Meehan et al. and Tomita to add an extra network storage unit as taught by Kawamoto et al. in paragraph 93, at lines 2-3.

The motivation for doing so would have been to "increase the disk capacity size by adding new network storage units" as expressly taught by Kawamoto et al. in paragraph 92, at lines 3-4.

Therefore, it would have been obvious to combine Kawamoto et al. with Meehan et al. and Tomita for the benefit of increased disk capacity to obtain the invention as specified in claim 3.

13. **Claim 4** discloses "a fourth receiving unit **["Level 3 RAID Controller (1)" 320, Figure 5** that receives a calculation result of an exclusive OR between write data and the first storage data as well as the first identifier from said added other storage unit **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]**,

said calculation result being calculated by said added other storage unit that receives the write data **[data write operation, Meehan et al., Paragraph 6, Lines 3-5]** to said first hard disk drives of said added other storage from an information processing unit **["Primary RAID Controller" 305, Figure 5 of Meehan et al.]**, said first storage data being stored in the storage block of said first hard disk drives **[Logical Sectors of the "Data Disks", Figure 3, Patterson et al.]** in which the write data is to be written" **Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "old data" corresponds to the "first storage data" from the claim, and the "new data" corresponds to the "write data" from the claim. The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to update the parity (refer to the parity update equation above), it is inherent that the "Level 3 RAID Controller (1)" receives the result of "old data xor new data" from the "Secondary RAID Controller (1)". Since the "Level 3 RAID Operation Controller (1)" receives the result of the excusive OR, it is inherent that the "Level 3 RAID Operation Controller (1)" contains the "fourth receiving unit" from the claim which performs the same operation. **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "fourth receiving unit" from the claim.

"A fourth operation controller **["Level 3 RAID Controller (1)" 320, Figure 5]** that calculates an exclusive OR between the calculation result received by said fourth receiving unit and second storage data stored in the storage block of said second hard disk drives identified by the second identifier corresponding to the first identifier received by said fourth receiving unit" **Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "old parity" corresponds to the "second storage data" from the claim. The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Patterson et al. disclose "each parity bit is just a single exclusive OR of all corresponding data bit in a group" on page 113, in the second column, at lines 9-10,** wherein the correspondence is established among the logical sector numbers of the "data disks" ("first identifiers" from the claim) and the logical sector numbers of the "check disk" ("second identifiers" from the claim) disclosed in Figure 3. Since the "Level 3 RAID Controller" performs the XOR operation as the "fourth operation controller" from the claim does, it inherently contains the "fourth operation controller".

"A fourth storage controller **["(a) Level RAID Controller" 330, Figure 5 of Meehan et al.]** that stores a calculation result of the exclusive OR into the storage block of said second hard disk drives identified by the second identifier" **Meehan et al. disclose in paragraph 6, at lines 3-4, "RAID controller** ("(a) Level RAID Controller" 330) **that reads and writes data** ("calculation result" from the claim) **to the underlying storage**

devices ("second hard disk drives" from the claim)". **Patterson et al. disclose the data stored in logically partitioned parity disk ("Check Disk") with the sector numbers in Figure 3 on page 113, wherein the sector numbers of the "Check Disk"** correspond to the "second identifier" from the claim. Since the "(a) Level RAID Controller" stores the updated parity ("the result of the exclusive OR" from the claim), it is inherent that the "(a) Level RAID Controller" contains the "fourth storage controller" from the claim, which performs the same operation.

Meehan et al. and its incorporated references do not disclose expressly that "other communicably connected storage unit is added".

Kawamoto et al. disclose "the network storage unit for addition" in paragraph 93, at lines 2-3.

Meehan et al., Tomita and Kawamoto et al. are analogous art because they are from the same field of endeavor of managing/accessing network storages.

At the time of invention it would have been obvious to a person of ordinary skill in the art to modify Meehan et al. and Tomita to add an extra network storage unit as taught by Kawamoto et al. in paragraph 93, at lines 2-3.

The motivation for doing so would have been to "increase the disk capacity size by adding new network storage units" as expressly taught by Kawamoto et al. in paragraph 92, at lines 3-4.

Therefore, it would have been obvious to combine Kawamoto et al. with Meehan et al. and Tomita for the benefit of increased disk capacity to obtain the invention as specified in claim 4.

14. **Claim 8** discloses, "receiving a copy of the first storage data and the first identifiers from said added other storage unit **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to "calculate check info" (Figure 3, Patterson et al.), it is inherent that the "Level 3 RAID Controller (1)" receives copies of parity data of "Disk 2" and "Disk x" ("first data" from the claim) from the "Secondary RAID Controller (1)". **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim, the "components" corresponds to the "Level 3 RAID Controller".

"Said first storage data being stored in the storage blocks of said first hard disk drives of said added other storage unit" **Patterson et al. disclose the data stored in logically partitioned data disks ("Data Disks 1-4") with the sector numbers** (identifies the "blocks" from the claim) **in Figure 3 on page 113.**

"Calculating an exclusive OR between the copy of said first storage data and second storage data stored in the storage blocks of said second hard disk drives identified by the second identifiers corresponding to the first identifiers" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8. **Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "old data" corresponds to the "first storage data" from the claim, and the "old parity" corresponds to the "second storage data" from the claim. Since there is no new data being written, the above equation becomes **"new parity = old data xor old parity". Patterson et al. disclose "each parity bit is just a single exclusive OR of all corresponding data bit in a group" on page 113, in the second column, at lines 9-10,** wherein the correspondence is established among the logical sector numbers of the "data disks" ("first identifiers" from the claim) and the logical sector numbers of the "check disk" ("second identifiers" from the claim) disclosed in Figure 3.

"Storing a calculation result of the exclusive OR into the storage blocks of said second hard disk drives identified by the second identifiers" **Meehan et al. disclose in paragraph 6, at lines 3-4, "RAID controller that reads and writes data** ("calculation result" from the claim) **to the underlying storage devices** ("second hard disk drives" from the claim)". **Patterson et al. disclose the data stored in logically partitioned parity disk ("Check Disk") with the sector numbers in Figure 3 on page 113, wherein the sector numbers of the "Check Disk"** ("second identifier" from the claim)

corresponds to the sector numbers of the "Data Disks" ("first identifier" from the claim) **(Page 113, Column 2, Lines 9-10).**

Meehan et al. and its incorporated references do not disclose expressly that "other communicably connected storage unit is added".

Kawamoto et al. disclose "the network storage unit for addition" in paragraph 93, at lines 2-3.

Meehan et al., Tomita and Kawamoto et al. are analogous art because they are from the same field of endeavor of managing/accessing network storages.

At the time of invention it would have been obvious to a person of ordinary skill in the art to modify Meehan et al. and Tomita to add an extra network storage unit as taught by Kawamoto et al. in paragraph 93, at lines 2-3.

The motivation for doing so would have been to "increase the disk capacity size by adding new network storage units" as expressly taught by Kawamoto et al. in paragraph 92, at lines 3-4.

Therefore, it would have been obvious to combine Kawamoto et al. with Meehan et al. and Tomita for the benefit of increased disk capacity to obtain the invention as specified in claim 8.

15. **Claim 9** discloses "receiving a calculation result of an exclusive OR between write data and the first storage data as well as the first identifier from said added other storage unit **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]**, said calculation result being calculated by said added other storage unit that receives the write data **[data write operation, Meehan et al., Paragraph 6, Lines 3-5]** to said first hard disk drives of said added other storage from an information processing unit **["Primary RAID Controller" 305, Figure 5 of Meehan et al.]**, said first storage data being stored in the storage block of said first hard disk drives **[Logical Sectors of the "Data Disks", Figure 3, Patterson et al.]** in which the write data is to be written" **Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "old data" corresponds to the "first storage data" from the claim, and the "new data" corresponds to the "write data" from the claim. The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to update the parity (refer to the parity update equation above), it is inherent that the "Level 3 RAID Controller (1)" receives the result of "old data xor new data" from the "Secondary RAID Controller (1)". **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "Level 3 RAID Operation Controller (1)".

"Calculating an exclusive OR between the calculation result and second storage data stored in the storage block of said second hard disk drives identified by the second identifier corresponding to the first identifier" **Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "old parity" corresponds to the "second storage data" from the claim. The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Patterson et al. disclose "each parity bit is just a single exclusive OR of all corresponding data bit in a group" on page 113, in the second column, at lines 9-10,** wherein the correspondence is established among the logical sector numbers of the "data disks" ("first identifiers" from the claim) and the logical sector numbers of the "check disk" ("second identifiers" from the claim) disclosed in Figure 3.

"Storing a calculation result of the exclusive OR into the storage block of said second hard disk drives identified by the second identifier" **Meehan et al. disclose in paragraph 6, at lines 3-4, "RAID controller** ("(a) Level RAID Controller" 330) **that reads and writes data** ("calculation result" from the claim) **to the underlying storage devices** ("second hard disk drives" from the claim)**". Patterson et al. disclose the data stored in logically partitioned parity disk ("Check Disk" and "Data Disk") with the sector numbers in Figure 3 on page 113, wherein the sector numbers of the "Check Disk" correspond to the "second identifier" from the claim.**

Meehan et al. and its incorporated references do not disclose expressly that "other communicably connected storage unit is added".

Kawamoto et al. disclose "the network storage unit for addition" in paragraph 93, at lines 2-3.

Meehan et al., Tomita and Kawamoto et al. are analogous art because they are from the same field of endeavor of managing/accessing network storages.

At the time of invention it would have been obvious to a person of ordinary skill in the art to modify Meehan et al. and Tomita to add an extra network storage unit as taught by Kawamoto et al. in paragraph 93, at lines 2-3.

The motivation for doing so would have been to "increase the disk capacity size by adding new network storage units" as expressly taught by Kawamoto et al. in paragraph 92, at lines 3-4.

Therefore, it would have been obvious to combine Kawamoto et al. with Meehan et al. and Tomita for the benefit of increased disk capacity to obtain the invention as specified in claim 9.

16. **Claim 13** disclose "a third data sending unit **["Level 3 RAID Controller (1)", Figure 5 of Meehan et al.]** sends a request to send a copy of the first storage data stored in the storage blocks of said first hard disk drives, as well as the first identifiers that identify the storage blocks in which the first storage data is stored, to said added

first storage unit **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to "calculate check info" (Figure 3, Patterson et al.), it is inherent that the "Level 3 RAID Controller (1)" receives copies of parity data of "Disk 2" and "Disk x" ("first data" from the claim) from the "Secondary RAID Controller (1)". Therefore, when a new storage unit is added, the "Level 3 RAID Controller (1)" sends the request to send the new storage unit's data. **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "third data sending unit" from the claim. Since the "Level 3 RAID Controller (1)" performs the same operation as the "third data sending unit" from the claim, it is inherent that the "Level 3 RAID Controller (1)" contains the "third data sending unit".

"A fourth data sending unit **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]** that sends the copy of the first storage data stored in the storage blocks of said first hard disk drives, as well as the first identifiers to said second storage unit **["Level 3 RAID Controller (1)" and its sub-disks 320, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in

paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to "calculate check info" (Figure 3, Patterson et al.), it is inherent that the "Level 3 RAID Controller (1)" receives copies of parity data of "Disk 2" and "Disk x" ("first data" from the claim) from the "Secondary RAID Controller (1)". Therefore, when a new storage is added, the "Level 3 RAID Controller (1)" sends the request for data, and in response, the "Secondary RAID Controller (1)" sends the requested data to the "Level 3 RAID Controller". **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "second storage unit" from the claim. Since the "Level 3 RAID Controller (1)" performs the same operation as the "fourth data sending unit" from the claim, it is inherent that the "Level 3 RAID Controller (1)" contains the "fourth data sending unit".

"a third data receiving unit **["Level 3 RAID Controller (1)", Figure 5 of Meehan et al.]** that receives a copy of the first storage data and the first identifiers from said added other storage unit **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]"** The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to "calculate check info" (Figure 3, Patterson et al.), it is inherent that the "Level 3 RAID Controller (1)"

receives copies of parity data of "Disk 2" and "Disk x" ("first data" from the claim) from the "Secondary RAID Controller (1)". **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "third receiving unit" from the claim. Since the "Level 3 RAID Controller (1)" performs the same operation as the "third data receiving unit" from the claim, it is inherent that the "Level 3 RAID Controller (1)" contains the "third data receiving unit".

"A fourth data operation controller **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that calculates an exclusive OR between the copy of said first storage data received by said third data receiving unit and second storage data stored in the storage blocks of said second hard disk drives identified by the second identifiers corresponding to the first identifiers received by said third data receiving unit **["Level 3 RAID Controller (1)" 320, Figure 5 of Meehan et al.]**" The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8. **Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "old data" corresponds to the "first storage data" from the claim, and the "old parity" corresponds to the "second storage data" from the claim. Since there is no new data being written, the above equation becomes **"new parity = old data xor old**

parity". Patterson et al. disclose "each parity bit is just a single exclusive OR of all corresponding data bit in a group" on page 113, in the second column, at lines 9-10, wherein the correspondence is established among the logical sector numbers of the "data disks" ("first identifiers" from the claim) and the logical sector numbers of the "check disk" ("second identifiers" from the claim) disclosed in Figure 3. Since the "Level 3 RAID Controller (1)" calculates an exclusive OR between the first storage data and second storage data, it is inherent that "Level 3 RAID Operation Controller" contains the "fourth data operation controller" from the claim, which performs the same operation.

"A third data storage controller **["(a) Level RAID Controller (1)" 320, Figure 5 of Meehan et al.]** that stores a calculation result of the exclusive OR into the storage blocks of said second hard disk drives identified by the second identifiers" **Meehan et al. disclose in paragraph 6, at lines 3-4, "RAID controller** ("(a) Level RAID Controller" 330) **that reads and writes data** ("calculation result" from the claim) **to the underlying storage devices** ("second hard disk drives" from the claim)**". Patterson et al. disclose the data stored in logically partitioned parity disk ("Check Disk") with the sector numbers in Figure 3 on page 113, wherein the sector numbers of the "Check Disk"** ("second identifier" from the claim) **corresponds to the sector numbers of the "Data Disks"** ("first identifier" from the claim) **(Page 113, Column 2, Lines 9-10).** Since the "(a) Level RAID Controller (1)" performs the same operation as the "third data storage controller" from the claim, it inherently contains "third data storage controller"

Meehan et al. and its incorporated references do not disclose expressly that "other communicably connected storage unit is added".

Kawamoto et al. disclose "the network storage unit for addition" in paragraph 93, at lines 2-3.

Meehan et al., Tomita and Kawamoto et al. are analogous art because they are from the same field of endeavor of managing/accessing network storages.

At the time of invention it would have been obvious to a person of ordinary skill in the art to modify Meehan et al. and Tomita to add an extra network storage unit as taught by Kawamoto et al. in paragraph 93, at lines 2-3.

The motivation for doing so would have been to "increase the disk capacity size by adding new network storage units" as expressly taught by Kawamoto et al. in paragraph 92, at lines 3-4.

Therefore, it would have been obvious to combine Kawamoto et al. with Meehan et al. and Tomita for the benefit of increased disk capacity to obtain the invention as specified in claim 13.

17. **Claim 14** discloses, "a fifth data operation controller **["Secondary RAID Controller (1)" 310, Figure 5 of Meehan et al.]**, when write data **[data write operation, Meehan et al., Paragraph 6, Lines 3-5]** to said first hard disk drives is

received from an information processing unit **["Primary RAID Controller" 305, Figure 5 of Meehan et al.]**, calculates an exclusive OR between the write data and the first storage data stored in the storage block of said first hard disk drives **[Logical Sectors of the "Data Disks", Figure 3, Patterson et al.]** into which the write data is to be written" **Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "old data" corresponds to the "first storage data" from the claim, and the "new data" corresponds to the "write data" from the claim. The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to update the parity (refer to the parity update equation above), the "Secondary RAID Controller (1) performs XOR between the "first storage data" and the "write data" and sends the result to the parity storage unit to complete the above. Since the "Secondary RAID Controller (1)" calculates the XOR between write data and existing data, it is inherent that the "Secondary RAID Controller" contains the "fifth operation controller" from the claim which performs the same operation.

"A fifth data sending unit **["Secondary RAID Controller (1)", Figure 5 of Meehan et al.]** that sends a calculation result of the exclusive OR calculated by said fifth data operation controller, as well as the first identifier identifying the storage block into which the write data is to be written, to said second storage unit **["Level 3 RAID Controller (1)" and its sub-disks 320, Figure 5]" Patterson et al. disclose, "new parity = (old**

data xor new data) xor old parity" on page 113, in column 2. The "old data" corresponds to the "first storage data" from the claim, and the "new data" corresponds to the "write data" from the claim. The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to update the parity (refer to the parity update equation above), the "Secondary RAID Controller (1)" performs "old data xor new data", however, the "old parity" is stored in the second storage unit. Therefore, in order to complete the calculation, the result of "old data xor new data" is sent to the "second storage unit" from the claim. Since the "Secondary RAID Controller (1)" sends the result of the excusive OR, it is inherent that the "Secondary RAID Controller (1)" contains the "fifth data sending unit" from the claim which performs the same operation. **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "second storage unit" from the claim.

"A fourth data receiving unit **["Level 3 RAID Controller (1)" 320, Figure 5]** that receives a calculation result of the exclusive OR calculated by said fifth data operation controller, as well as the first identifier, from said added first storage unit **["Secondary RAID Controller (1)" and its sub-disks 310, Figure 5 of Meehan et al.]" Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in**

column 2. The "old data" corresponds to the "first storage data" from the claim, and the "new data" corresponds to the "write data" from the claim. The "Level 3 RAID Controller" and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. In order to update the parity (refer to the parity update equation above), it is inherent that the "Level 3 RAID Controller (1)" receives the result of "old data xor new data" from the "Secondary RAID Controller (1)" to complete the above equation. Since the "Level 3 RAID Operation Controller (1)" receives the result of the excusive OR, it is inherent that the "Level 3 RAID Operation Controller (1)" contains the "fourth data receiving unit" from the claim which performs the same operation. **In paragraph 26, at lines 19-21, Meehan et al. disclose, "each RAID controller may assign unique identification or LUNs to the components or nodes it controls."** The "identification" corresponds to the "first identifiers" from the claim, and the "components" correspond to the "fourth data receiving unit" from the claim.

"A sixth data operation controller **["Level 3 RAID Controller (1)" 320, Figure 5]** that calculates an exclusive OR between the calculation result received by said fourth data receiving unit and second storage data stored in the storage block of said second hard disk drives identified by the second identifier corresponding to the first identifier received by said fourth data receiving unit" **Patterson et al. disclose, "new parity = (old data xor new data) xor old parity" on page 113, in column 2.** The "old parity" corresponds to the "second storage data" from the claim. The "Level 3 RAID Controller"

and its sub-disks are operating as a RAID-4 parity disk for the "Secondary RAID Controller" as taught by Meehan et al. in paragraph 23, at lines 7-8 and Patterson et al. in Figure 3. **Patterson et al. disclose "each parity bit is just a single exclusive OR of all corresponding data bit in a group" on page 113, in the second column, at lines 9-10,** wherein the correspondence is established among the logical sector numbers of the "data disks" ("first identifiers" from the claim) and the logical sector numbers of the "check disk" ("second identifiers" from the claim) disclosed in Figure 3. Since the "Level 3 RAID Controller" performs the XOR operation as the "sixth data operation controller" from the claim does, it inherently contains the "sixth data operation controller".

"A fourth data storage controller **["(a) Level RAID Controller" 330, Figure 5 of Meehan et al.]** that stores a calculation result of the exclusive OR into the storage block of said second hard disk drives identified by the second identifier" **Meehan et al. disclose in paragraph 6, at lines 3-4, "RAID controller** ("(a) Level RAID Controller" 330) **that reads and writes data** ("calculation result" from the claim) **to the underlying storage devices** ("second hard disk drives" from the claim)**". Patterson et al. disclose the data stored in logically partitioned parity disk ("Check Disk") with the sector numbers in Figure 3 on page 113, wherein the sector numbers of the "Check Disk"** correspond to the "second identifier" from the claim. Since the "(a) Level RAID Controller" stores the updated parity ("the result of the exclusive OR" from

the claim), it is inherent that the "(a) Level RAID Controller" contains the "fourth data storage controller" from the claim, which performs the same operation.

Meehan et al. and its incorporated references do not disclose expressly that "other communicably connected storage unit is added".

Kawamoto et al. disclose "the network storage unit for addition" in paragraph 93, at lines 2-3.

Meehan et al., Tomita and Kawamoto et al. are analogous art because they are from the same field of endeavor of managing/accessing network storages.

At the time of invention it would have been obvious to a person of ordinary skill in the art to modify Meehan et al. and Tomita to add an extra network storage unit as taught by Kawamoto et al. in paragraph 93, at lines 2-3.

The motivation for doing so would have been to "increase the disk capacity size by adding new network storage units" as expressly taught by Kawamoto et al. in paragraph 92, at lines 3-4.

Therefore, it would have been obvious to combine Kawamoto et al. with Meehan et al. and Tomita for the benefit of increased disk capacity to obtain the invention as specified in claim 14.

Relevant Art Cited by the Examiner

The following prior art made of record and not relied upon is cited to establish the level of skill in the applicant's art and those arts considered reasonably pertinent to applicant's disclosure. See MPEP 707.05(C). The following reference teaches parity protection generated by XOR.

U.S. Patent Number	**Figures**
6,530,035	1-5

Conclusion

A. Claims Rejected in the Application

Per the instant office action, claims 1-15 have received a first action on the merits and are subject of a first action non-final.

B. Direction of Future Correspondences

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jae U. Yu whose telephone number is 571-272-1133. The examiner can normally be reached on M-F 9AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald A. Sparks can be reached on 571-272-4201. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

January 30, 2006

Jae Un Yu
Patent Examiner
Art Unit 2185

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DONALD SPARKS
SUPERVISORY PATENT EXAMINER